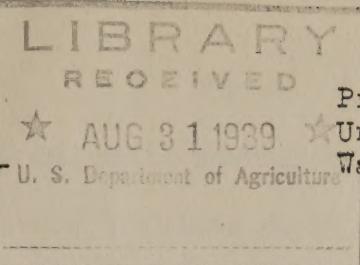


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THE WEATHER BUREAU'S SERVICE TO MEET
METEOROLOGICAL PROBLEMS OF AVIATION

Since the early days of flying, weather has been one of the major problems of aviation. However, very little was accomplished in the way of furnishing the necessary meteorological service to aeronautical activity until Congress passed, in 1926, the Air Commerce Act, which charged the Weather Bureau with the responsibility of furnishing an adequate meteorological service to aviation in order "to promote the safety and efficiency of air navigation in the United States and above the high seas". Again in 1938, under the Civil Aeronautics Act, the Weather Bureau was similarly charged with providing necessary service to aviation.

Since the first pioneer service which was established by authority of the Air Commerce Act of 1926, the airways service of the Weather Bureau has endeavored to solve the meteorological problems which confront the flyer and in doing so has expanded its facilities to the greatest extent within the limits of available funds.

It was early recognized that three major weather problems confront the aviator: It is necessary to know (1) the present weather, (2) the best route or level for efficient operation, and (3) expected weather during the time of the flight.

In order to meet the problem of present weather information, the Weather Bureau has increased its number of observing stations until now there are 840 airport, off-airway, and airway weather reporting stations. Off-airway stations telegraph or telephone the weather reports to airports where they are transmitted

over the extensive teletype and radio communication network of the Civil Aero-nautics Authority. This network provides rapid communication of meteorological information between weather reporting stations and air terminals along the 38,000 miles of civil airways. Transmission of reports on the network takes place at least once each hour for stations located on the airways. In addition, information about existing weather conditions is broadcast to pilots in the air once each hour or oftener by Civil Aeronautics Authority radio stations.

Weather elements as observed at the surface generally include: ceiling (height of cloud layer above the ground); sky conditions (clear, scattered or broken clouds, overcast); visibility; weather (rain, snow, etc.); obstructions to vision (fog, haze, etc.); temperature; dew point; wind direction and velocity, and barometric pressure. Such conditions are reported every hour (or oftener in bad weather) from 295 stations located on the airways. More complete reports are made every six hours by a system of 380 stations, including 155 off the airways. Extra reports from certain of these stations located in strategic areas are also collected every three hours. At 314 stations, observations are rendered at special times in connection with scheduled flights and when called for by supervising airport stations. It is from a collection of reports from all of this network of stations that the Weather Bureau can furnish the information regarding present weather.

In order to give the flyer the latest information which will enable him to choose a flying level or route where the winds will be of most aid or least resistance, a system of 101 pilot balloon stations has been developed. Observers at these stations make observations of wind directions and velocities at flying levels every six hours by following through a special telescope, the path of an

ascending balloon inflated with hydrogen or helium to a diameter of two to three and one-half feet. From a collection of these reports, upper-air maps are drawn from which the pilot can determine the most advantageous level of flight. In some instances, pilots flying in opposite directions over the same route can each secure the help of tail winds by choosing different levels at which to fly.

Upper-air observations, made by pilots in flight, are received by the Weather Bureau stations and used in providing other pilots with information of conditions aloft.

Before a flight is made, it is of great importance that the pilot be acquainted with expected conditions along the route and at the destination of the flight. To provide this information, the Weather Bureau has developed its airway forecast service.

Of special benefit to improved methods of forecasting is the system of 37 stations, including seven cooperating stations of the Navy and two of the Army, where daily observations are made of conditions in the upper air by means of the radiosonde. This is a lightweight instrument, with a radio transmitter, which, after being attached to a balloon and released, will transmit a record by radio of the barometric pressure, temperature, and relative humidity as it ascends. This information is useful in identifying air masses, tracing their movement, and defining their boundaries, as well as indicating stability of the atmosphere, water vapor content of the air, and the likelihood of clouds, precipitation, icing, etc.

From a collection of all the types of reports which have been described, Weather Bureau meteorologists at about 125 important airports draw charts of existing weather conditions over North America and adjoining oceans. Further-

more, thirteen of the Weather Bureau Airport Stations located in different parts of the United States have special surveillance of the weather in their respective districts, which altogether cover the entire United States and, in cooperation with other countries, the transatlantic air routes. Each of these thirteen stations issues forecasts every six hours regarding expected weather conditions over airways in its district. Special forecasts are also issued when weather conditions are changing rapidly. These predictions are given wide distribution by means of the teletype network and are broadcast to pilots in the air by Civil Aeronautics Authority radio stations.

Accurate and efficient meteorological instruments are required in order that all types of weather observations may be made with the necessary degree of speed and precision. Decided advances have been accomplished within the last two years in the development and improvement of such instruments. It is now possible to measure ceilings at night to heights of more than 10,000 feet by means of the latest type of ceiling light projector. Further research is now in progress which is expected to produce a modulated beam type ceiling light which can be used for measurement of ceilings during daylight. The radiosonde has now been developed to such a high degree of efficiency that conditions aloft are quite frequently measured to heights of more than fifteen miles. This instrument can no doubt eventually be developed to indicate the direction and velocity of winds aloft, thus making this data available even when low clouds or precipitation prevent the observing of pilot balloons.

Fully recognizing the fact that its services must grow with expanding air commerce activity, the Weather Bureau is making plans for an extension of its facilities where needed and an intensification of its present service. Along this line, the forecast service is being improved by the thorough training of

the forecasters in the latest methods of maps and chart interpretation and analysis. An expected increase in the number of radiosonde stations will be of vital importance in utilizing these new methods to a greater extent. Additional surface and upper-air reports from ships at sea are necessary to meet the needs of an expanding transoceanic flying service; the Weather Bureau is taking important steps along this line in order to furnish vital information concerning oceanic weather conditions. Increased activity in commercial aviation in Alaska will require that weather service be expanded in that territory; the Weather Bureau is making definite progress in this expansion.

It is not difficult to imagine the progress which will be accomplished by aviation in the next decade. One has only to glance at the records of the last few years to realize that we now recognize the importance of this great industry. But we must keep pace with aviation's phenomenal growth in order that a high standard of safety in air travel will be maintained. The Weather Bureau stands ready and willing to do its part in this building of a system of protection, and maintenance of standards of safety so that we may continue to have Air Progress, in the years to come.

